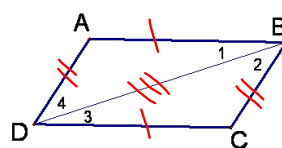
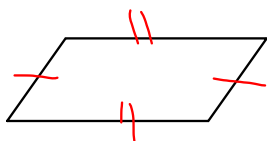


### 8.3 Show that a Quadrilateral is a Parallelogram

Theorem 8.7 If both pairs of opposite sides are congruent, then the quadrilateral is a parallelogram.



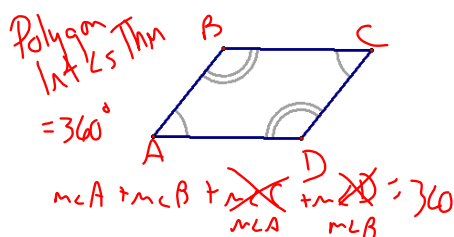
Given:  $\overline{AB} \cong \overline{CD}$   
 $\overline{AD} \cong \overline{BC}$

Prove: ABCD is a parallelogram

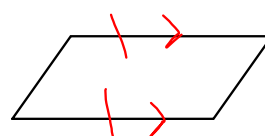
St.	Reasons
① $\overline{AB} \cong \overline{CD}$	① Given
② $\overline{BD} \cong \overline{BD}$	② Reflexive
③ $\triangle ABD \cong \triangle CDB$	③ SSS
④ $\angle 1 \cong \angle 3; \angle 4 \cong \angle 2$	④ CPCTC
⑤ $\overline{AB} \parallel \overline{CD}$ $\overline{AD} \parallel \overline{BC}$	⑤ Alt. Int. $\angle$ s Conv.
⑥ ABCD is a $\square$	⑥ def of $\square$

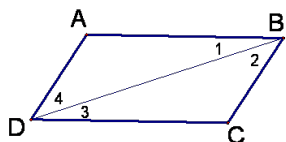
Theorem 8.8 If both pairs of opposite angles are congruent, then the quadrilateral is a parallelogram.

Theorem 8.9 If one pair of opposite sides is both congruent and parallel, then the quadrilateral is a parallelogram.



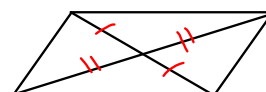
Proof plan?





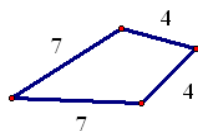
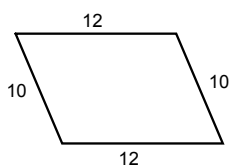
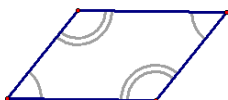
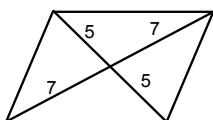
Given:  
Prove:

Theorem 8.10 If the diagonals bisect each other, then the quadrilateral is a parallelogram.

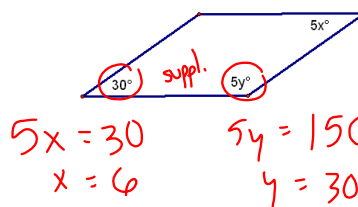


Proof plan?

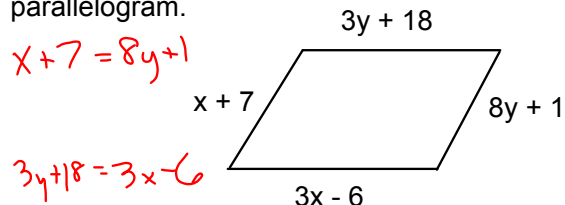
Are the following parallelograms? Why?



Find  $x$  and  $y$  so that the quad. is a parallelogram.



Find  $x$  and  $y$  so that the quad. is a parallelogram.



$$\begin{array}{rcl} x - 8y & = & -6 \\ -3x + 13y & = & -24 \\ \hline -x + y & = & -8 \end{array} \quad \begin{array}{rcl} -7y & = & -14 \\ y & = & 2 \end{array} \quad x = 10$$

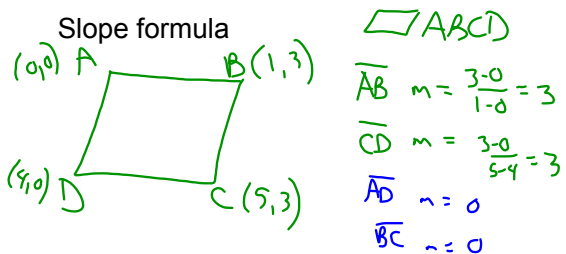
Parallelograms on the coordinate plane.

- distance, midpoint, and slope can be used to determine if a quadrilateral is a parallelogram

Determine whether a figure with the given vertices is a parallelogram. Use the indicated method.

$A(0, 0)$   $B(1, 3)$   $C(5, 3)$   $D(4, 0)$

Slope formula



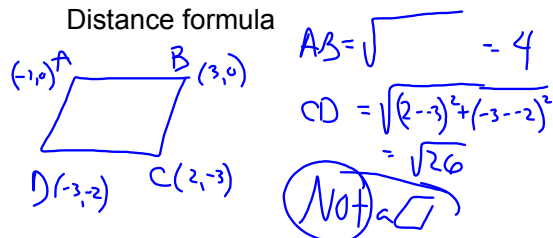
$$\overline{AD} \parallel \overline{BC} \quad \& \quad \overline{AB} \parallel \overline{CD}$$

b/c they have the same slopes  
 $\therefore ABCD$  is a  $\square$

Determine whether a figure with the given vertices is a parallelogram. Use the indicated method.

$A(-1, 0)$   $B(3, 0)$   $C(2, -3)$   $D(-3, -2)$

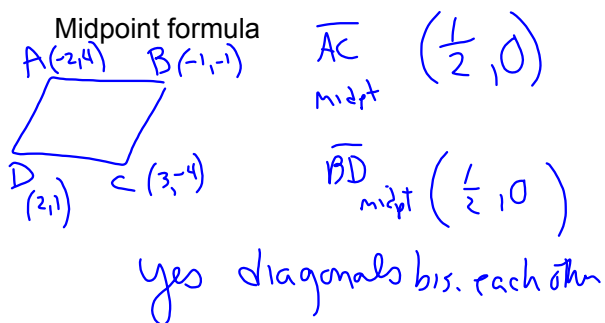
Distance formula



Determine whether a figure with the given vertices is a parallelogram. Use the indicated method.

A(-2, 4) B(-1, -1) C(3, -4) D(2, 1)

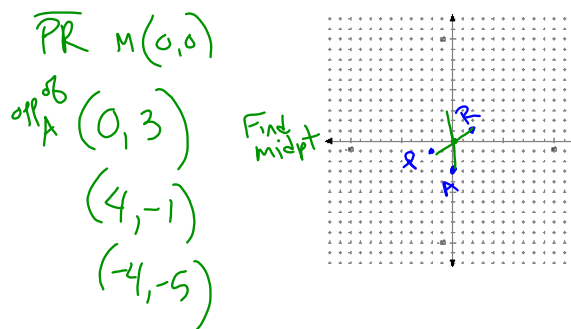
Midpoint formula



A parallelogram has the vertices

P(-2, -1) R(2, 1) and A(0, -3).

Find all possible coordinates of the 4th vertex.



HW

p526-529

4-6, 11-14, 19-21, 25, 26, 38, 39